HALSTED[27] has also issued a bulletin which gives a good general discussion of Mendelism as exemplified by cooperative experiments in the breeding of corn. In 1904 "Black Mexican" sweet corn was crossed with nearly a full list of the commercial varieties of sweet corn, and the hybrid ears thus obtained were sent to a number of volunteer observers in different parts of the state, who returned samples and notes which are incorporated into this bulletin. The presentation is simple and easily understood, but several unfortunate typographical errors are likely to prove confusing, as when on p. 15 in the table showing what may be expected in the second generation of a cross between large grained flint black, and small grained sweet white, the fourth category (large sweet white) is weighted with the value 9 instead of 3; and again, when on p. 21, line 7, "white" is used for "dark."

An improper emphasis is laid upon the difficulty of freeing the dominant form from traces of the recessive. Thus, he says that after nineteen generations of selection there will still be one recessive grain in each four hundred, adding that "this underlying rule," which appears to hold more or less closely, helps to indicate how difficult it is to eradicate entirely any characteristic that has been introduced in breeding." He seems to have overlooked the importance of VILMORIN'S principle of isolation, by which it requires only one more generation to obtain pure extracted dominants than extracted recessives, so that after the *third* generation he need never have another recessive grain appear.—GEORGE H. SHULL.

Inheritance in Shirley poppies.—PEARSON and his associates, with the aid of a number of volunteer observers, have presented a second paper[28] on inheritance in the Shirley poppy. Some of the questions that were left open in the earlier report[29] have been settled. Thus, it was assumed that Shirley poppies both self- and cross-fertilize, and the discussions were based upon that assumption. It is now found that when flowers are enclosed in bags of bolting-cloth or oiled paper, almost no fertilization takes place. Fifty bagged flowers produced seeds in only four, and these gave rise to nine plants. The conclusion is reached, therefore, that seeds taken from unprotected capsules are essentially the result of cross-fertilization; and the correlation of offspring with each other and with their antecedents should be the same as in other populations in which self-fertilization does not occur, as in animals and man. Although the correlation found is somewhat lower than the average for animals, a number of modifying factors are pointed out which would tend to lessen the correla-

[27] HALSTED, B. D., Breeding sweet corn—cooperative tests. N. J. Agr. Exp. Sta. Bull. 192. pp. 30. *pls. 4, figs. 8.* March 1906.

[28] PEARSON, K., et al., Cooperative investigations in plants. III. On inheritance n the Shirley poppy. Second Memoir. Biometrika 4:394–426. 1 *pl.* (colored). 1906.

[29] PEARSON, K., et al., Cooperative investigation in plants. I. On inheritance n the Shirley poppy. Biometrika 2:56–100. 1902.

tion, and the opinion is expressed that there is no reason to believe that the strength of inheritance is any different in Shirley poppies from that in animals.

Another gain is seen in the recognition of the entire plant as the hereditary unit, instead of the separate flowers, the latter view having been maintained in the earlier paper.

The characters used were the number of stigmatic bands, number of petals and petaloid stamens, color of petals, presence of a margin, presence of a basal spot and its color, and wrinkling of the petals. Each of these characters was divided into a number of categories designated in a manner that makes the personal equation a very large factor, *e. g.* with reference to the presence of a basal spot, the classes are "none, none to slight, slight, slight to well-defined, well-defined, well-defined to large, large." The observers found these categories very difficult to separate, and think there is no evidence of allelomorphic characters. They believe that the same is true in many studies made by those who accept MENDEL'S laws of inheritance. It need scarcely be pointed out that seeds secured from unguarded flowers from a field as heterogeneous as one of Shirley poppies could hardly be expected to show evidences of allelomorphic characters.—GEORGE H. SHULL.

Drying of seedlings and sporelings.—RABE finds that germinated seeds and spores resist drying more or less well.[30] With advancing germinative stages and exhaustion of reserve food the resistance to drying diminishes. Seedlings will withstand much longer drying in the air than in a sulfuric acid desiccator. The separated hypocotyl of a seedling always dies upon being fully dried out. The cotyledons are more resistant than the plumule, and of the latter the growing point and the axillary buds are more resistant than the leaves. The separated and dried portions of the seedling, if they are yet alive, are as vigorous in reproducing as the separated portions of the fresh seedling. In spite of the defective storage and marked shrinkage, the seedling of the unripe seed will withstand drying nearly as well as the seedling of the ripe seed. Seedlings of xerophytes are more resistant to drying than those of hydrophytes. The presence of the seed coat is a disadvantage to the dried seedling. Rapid admission of water is more advantageous to the dried seedling than slow admission. Seedlings of related species show no relation in their power to withstand drying. Water-free chemical reagents, as alcohol and benzene, act more harmfully on germinated dried seedlings than on ungerminated dried seeds. The germinated dried as well as the ungerminated soaked seeds are more injured by diluted than by concentrated glycerin. The longer the glycerin acts the greater the injury. The germinated spores of mosses are extremely resistant to drying whether in the air or in a sulfuric acid desiccator. Germinated spores of ferns and liverworts withstand but little drying. The power of plants to withstand drying depends mainly upon the peculiar properties of their protoplasm.—WM. CROCKER.

[30] RABE, FRANZ, Ueber die Austrocknungsfähigkeit gekeimter Samen und Sporen Flora **95**: 253–324. 1905.